P: ISSN NO.: 2394-0344 RNI No.UPBIL/2016/67980 VOL-I* ISSUE- VIII* November- 2016
E: ISSN NO.: 2455-0817 Remarking An Analisation

Behavioural Studies of Steel Reinforced Concrete with Conventional Concrete

Abstract

This paper reports the study of compressive strength of concrete involving steel reinforced concrete in different proportions. The M-20 grades of concrete of cubes were made for the experiment.Steel was used from 5% to 15% at the interval of 5% by replacing Ordinary Portland Cement (O.P.C.). The compressive strength of concrete of different proportion with 5%, 10% and 15% cubes were checked at 7 days and 28 days of curing period. The results show that concrete cubes in which steel fibres are induced showed better strength as compared to the normal concrete cubes.

Keywords: Concrete Cubes, Compressive Strength, Steel Reinforced Concrete, Steel Fibres, Ordinary Portland Cement

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Introduction

The modern development of steel reinforced concrete started in the early sixties. Addition of steel to concrete makes it a homogeneous and isotropic material. When concrete cracks, the randomly oriented steel start functioning, arrest crack formation and propagation, and thus improve strength and ductility. Concrete is relatively brittle, and its tensile strength is typically only about one tenths of its compressive strength.

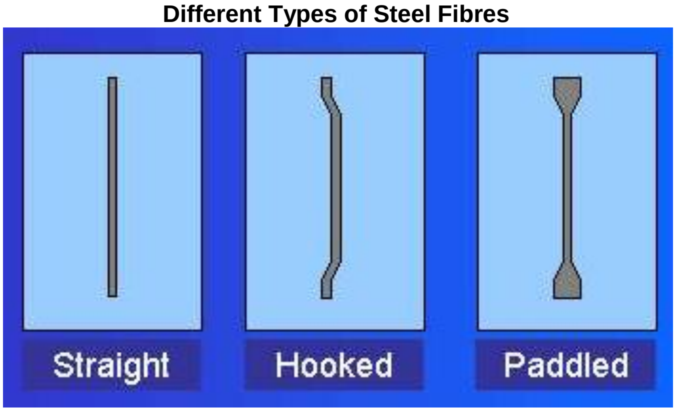
Concrete containing hydraulic cement, water, fine or fine and coarse aggregate and discontinuous discrete steel is called steel-reinforced concrete. Steel reinforced concrete (FRC) is a new structural material which is gaining increasing importance. Addition of steel reinforcement in discrete form improves many engineering properties of concrete. Currently, very little research work is being conducted within the Kingdom using this new material.

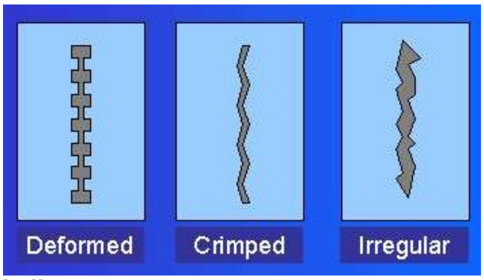
Steel fibers have been used in concrete to increase its ductility, toughness, impact resistance, and reduce crack propagation. The fibers are commercially available in lengths ranging from 1/2 to 3 inches. Typical fiber lengths for shotcrete range from 3/4 to 1-1/2 inches and are used in the amount of 1 to 2 percent by volume of the shotcrete. The fibers have little effect on compressive strength and produce only modest increases in flexural strength. However, they provide continued and, at times, improved load carrying capacity after the member has cracked.

Aim of the Study

1. To study the characteristics of Steel Reinforced Concrete.
2. To test the strength increasing behaviour in Steel Reinforced concrete.
3. Comparison between conventional concrete and Steel Reinforced Concrete.

Figure 1
Different Types of Steel Fibres





Steel Fiber Source

Steel fibers are manufactured in several ways. Wire fibers are produced from drawn wire that has been subsequently cut or chopped. Flat steel fibers are cut or slit from sheet of steel or by flattening wire. The melt-extraction process is used to "cast" fibers by extracting fibers from a pool of molten steel. Consequently, fibers are round, flat, or irregular in shape. Additional anchorage is provided by deformations along the fiber length or at the ends. Deformations can be natural irregularities, crimps, corrugations, hooks, bulbs, and others. Collated fibers and fibers with noncircular cross sections reduce the handling and batching problems common with straight, round fibers.

Proposed Methodology

In our proposed approach cubes are casted using Steel Fibres additives and simple conventional concrete cubes using appropriate proportion of materials after that the cubes are kept for curing period for 7 days, 14 days and 28 days. The cube are taken out from curing after its period gets over and is subjected to the compressive strength test and the values are taken for all cubes and by comparing their strength we get the desired result.

Procedure Adopted for Casting Cubes

Firstly calculate the various proportion weight for M20 (1: 1.5: 3) grade of concrete.

Then after calculating the weight of materials

1. Spread measured quantity of sand on the platform.
2. Dump sand over the cement.
3. Dry mix the cement and sand thoroughly, .
4. Spread the measured quantity of course aggregate in another place of platform.
5. Spread the sand cement mixer.
6. Thoroughly mix the whole mass mix the whole mass at least 3 times by shoveling and turning over by twist from centre to side then back to the centre and again to the sides.
7. Make a hollow in the middle of the mixed material.
8. Add measure quantity of water & slowly turn the whole mixture over & over again until each aggregate is coated with sand-cement mortar & the mixture should be uniform & plastic.
9. Apply grease on the inner surface of moulds.
10. Fill 1/3 of the mould until the prepared mixture & tamp it for 25 times tamping.
11. Again fill the mould with 2/3 of the prepared mix & tamp it for 25 times.
12. Completely the mould & level it and (also tamp the third layer).
13. In the same way fill the other two moulds.

Figure 3
Moulds prepared

Result and Discussion

For steel fibre cubes-add steel 5%,10% and 15%

Plain cube

Table 1
First Compressive Strength Test of Plain Cube after 7 Days

Mould Number	Load Applied nn (KN)	Compressive Stress (N/Sq. Mm)
1.	160	16.0
2.	172	17.2
3.	169	16.9

Table 2
Second Compressive Strength Test of Plain Cube after 28 Days

Mould Number	Load applied in (KN)	Compressive Stress (N/sq. mm)
1.	210	21
2.	217.6	21.76
3.	228	22.8

Fibre Reinforced Cubes

Table 3
First Compressive Strength Test of FRC after 7 Days

Mould Number	Compressive Stress (5% Steel - N/Sq. Mm)	Compressive stress (10% steel - N/sq. mm)	Compressive stress (15% steel - N/sq. mm)
1.	17	17.35	17.22
2.	17.66	17.54	17.37
3.	18.32	18.27	18.10

Table 4
Second Compressive Strength Test of FRC after 28 Days

Mould Number	Compressive stress (5% steel - N/ sq. mm)	Compressive stress (10% steel - N/ sq. mm)	Compressive stress (15% steel - N/sq. mm)
1.	32.6	30.16	26.70
2.	29.10	27.18	28.10
3.	30.11	26.60	25.95

Conclusion

From the above analysis it is concluded that:

1. The strength of steel reinforced concrete is more than nominal concrete.
2. The durability of steel reinforced concrete is more than nominal concrete.
3. The crack formation is low in steel reinforced concrete then nominal concrete.

4. Steel reinforced concrete Improves toughness of concrete more than conventional concrete.
5. Flexural strength is improved by up to 30% by decreasing the propagation of cracks in steel reinforced concrete.
6. Improves tensile strength than conventional concrete.

Therefore the Steel Reinforced concrete is better option used in concrete for better strength than nominal concrete.

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